A critical appraisal of "The value of adding mirror therapy for upper limb motor recovery of subacute stroke patients: a randomized controlled trial"

By

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Abstract

Mirror therapy is a form of physical therapy used in hemiplegic stroke patients to incorporate their uninvolved limb in the process of returning their involved limb to prior level of function in an effective manner. I gathered approximately 35 articles in my database search and narrowed down to this particular study to best answer my clinical question. I chose this article because of the clarity it provided in answering my question without adding in many extra limitations to the method or subject pool of the study. I began to thoroughly critique the article and found it to be quite reputable in the field of stroke rehabilitation, and it was backed up with sound literature for evidence. The study introduction, methods, results and discussion were evaluated and proven to be strong in their intended purposes.

Key words

Mirror therapy, validity, rehabilitation, stroke, appraisal

Introduction

This clinical appraisal was intended to assess the validity, usefulness, and clinical applicability of this study. I questioned all aspects of the results and methods and proved the study to be valid and reliable. The importance of this clinical appraisal was to confirm that the article could be interpreted by other readers to gain knowledge about a possible rehabilitation for stroke patients. My original clinical question was ‘Will mirror therapy in addition to conventional physical therapy yield better results on functional tests and assessments than a strictly conventional form of rehabilitation on stroke patients with hemiplegia?’. In this appraisal, I clarified that this article is in support of my question and how important this study could be for the future of physical therapy on patients whom have had a stroke.

Methods

The databases I used were PubMed and Cochrane Library. The keywords I used to search on all sites were “mirror therapy stroke”. I placed limits on my search including ‘free full text’ as well as ‘clinical trial’ and ‘randomized controlled trial’ under the article type section. I put the trial limits on the search so I did not have to manually go through the articles and check. Some inclusions from the articles I chose were: poststroke patients with severely impaired upper limb function, moderate and severe-subacute stroke patients with upper limb paresis, and subacute stroke patients less than 4 weeks from the time of stroke. I knew that this topic is not very heavily researched so I assumed I would gather around 40 articles before I began to narrow them down to the chosen article and I did find 35 articles to sort through in the beginning phase.

The article was published in the *European Journal of Physical and Rehabilitation Medicine* in 2013. The corresponding author of this article is M. Invernizzi, a Medical Doctor of Physical and Rehabilitation Medicine from the Department of Health Sciences and the University of Eastern Piedmont in Novara, Italy where the study was conducted. I chose this article because it provided a clear answer to my original clinical question by exemplifying how mirror therapy used in conjunction with conventional therapy is more beneficial than conventional alone.

Results

Summary of the study

The article is a single-blind, randomized controlled trial conducted to assess the addition of mirror therapy to conventional therapy in subacute stroke patients. The study consisted of 26

patients and followed them for 4 weeks through the therapy treatments. The group was randomly split in two, with both groups receiving 1 hour of personalized conventional stroke rehabilitation per session. The mirror therapy (MT) group received additional mirror therapy for 30 minutes each session for the first 2 weeks and 1 hour the second 2 weeks. The control group received the same extra exercises for the same duration, but placed a paper over the mirror, creating a placebo effect. The patients received this treatment 5 times a week for 4 weeks in a row. The patients were evaluated at baseline as well as after the completion of the 4 weeks. The evaluation tests were the Action Research Arm Test (ARAT), the Motricity Index of upper limb (MI), and the Functional Independence Measure (FI). The results proved that both groups made significant progress during the time of therapy, however, the MT group made substantially more progress on the tests.

Appraisal of the study introduction

The introduction provides adequate information about functional impairments due to stroke as well as what has been researched about mirror therapy in previous clinical trials. All of the literature sources are articles regarding stroke from credible journals such as the *Archives of Physical Medicine and Rehabilitation, Neurorehabilitation and Neural Repair, and the Journal of Cognitive Neuroscience.* The key words are identified as ‘stroke’, ‘mirror neurons’, ‘rehabilitation’, and ‘imagery (psychotherapy)’. They are all identified and clarified in the introduction, they go into detail about the history and background of mirror therapy and clarify that the mechanisms behind it are not a very heavily researched topic as well. The introduction is very clear and has a good flow.

Background knowledge on the mechanisms of a stroke could be added to strengthen this article and provide reference for readers without prior knowledge. Some of the cited articles are over a few decades

old, such as 1985, 1980, and 1992 which could be considered a weakness due to some information possibly being out dated.

Appraisal of the study methods

The research design is a single blind, randomized controlled trial. The direction is prospective and the duration is cross sectional because only one set of measurements were taken after the 4 weeks. There were 201 subjects assessed for eligibility, 103 did not meet criteria, 21 refused to participate, 51 were excluded which left the 26 subjects. There were two groups employed in the study, the control group and the experimental, being a between-subjects design. The group assignments were concealed from the investigators who enrolled or placed the subjects in each group by a random generator. The physical therapists that completed the outcome measures were blind to the group assignments and treatments. The sociodemographics of the subjects were not stated, however, the clinical and prognostic characteristics were similar at the start of the study. All subjects were managed the same in the sense that they were given specialized conventional physical therapy. The subjects in the mirror therapy group all received an extra 30 minutes of mirror therapy the first two weeks and an extra hour the last two weeks. The control group received the same amount of time and same form of therapy, just without the mirror. This trial could be easily replicated by other individuals in the future. The outcome measures are two different tests that are described in detail with appropriate references for each. The references went into greater detail about the reliability and validity of each test. The procedure of data collection is clear and in detail and could easily be replicated in the future. The tests both measure and assess upper limb function and activity level.

One subject did withdrawal due to a new stroke episode during the treatment. It could have impacted the mean results if that person would have had an increasingly different result than the other subjects. Since

the subjects are given specific therapy for the first hour of treatment, using different subjects in the future could skew the results in comparison to this first trial.

Appraisal of the study results

The results are presented in an organized manner in response to the research question. All procedures and methods of measures are given. They address the research question and respond with evidence. The hypothesis is backed up. They reported all three outcome measures and referenced tables to back up. Each figure and table are very clearly expressed and easy to follow and understand. 0.05 is the statistically significant p value identified in the abstract, the confidence interval is 95%, therefore there were statistically significant improvements in all of the variables measured.

The NNT was not mentioned in the article which could be a weakness.

Appraisal of the study discussion

The authors greatly furthered the meaning of the results in many paragraphs and explanations in the discussion. They have many references to credible sources throughout the discussion. Most of the references in the discussion are current relative to the published date of the article, the oldest literature referenced is from 1992 and it was an experimental neurophysiological study. Many of the sources are from the Archives of Physical Medicine and Rehabilitation as well as the Journal of Clinical Neurophysiology. The conclusion is very short and is directly reflective of the results in a simplified text. There is no future study suggested. They stated that this form of therapy has been shown to be an easy, cost effective tool in stroke rehabilitation.

The identified limitations in the study are the lack of follow-up and the lack of evaluating modifications in participation and quality of life in the subjects.

Discussion

This study provides a clear answer to my question by exemplifying how mirror therapy used in conjunction with conventional therapy is more beneficial than conventional alone. These findings of this study are relevant to all neuro-based physical therapists that treat stroke patients with hemiplegia. The addition of mirror therapy to conventional stroke therapy could be incredibly beneficial to recovery time and cost efficient for patients. Physical therapy is constantly evolving while keeping some beneficial conventional practices, and with more research, mirror therapy could be a beneficial addition.

I am in favor of the use of the intervention proposed in this study. The potential benefits for this form of rehabilitation are a quicker and more cost-effective recovery for patients. A potential risk is that a patient could injure themselves since during the mirror therapy they are looking at their uninvolved limb and not looking at the involved, which could cause an injury to the involved side. I believe that the benefits outweigh the risks and the patients will always have a say in their form of treatment if they do not believe the same then they are to be treated with other rehabilitation forms. Something that could improve this argument is to have more studies of this nature done on larger populations while paying more attention to pain perceived by the patients so that future patients will be able to reference.

I have enough confidence in the research validity of this study to consider using mirror therapy with potential future patients. I believe that if I had a patient that presented with hemiplegia due to a stroke, I would strongly consider adding mirror therapy to the rehabilitation plan because of the outcomes of this study and the minimal risk, still at the patient's discretion. I can anticipate implementing this intervention safely and appropriately in a clinical setting given my knowledge, skill levels and resources in the future because I will have more time to research this topic as new

studies are published or I have time to potentially do research of my own on this topic to be fully supportive of implementing this with all patients that fit the criteria.

This critical appraisal was intended to describe the process of finding a credible article that could potentially support my clinical question, to validate the usefulness, and interpret the clinical applicability of the study. In the critical appraisal, the study was found to be conducted by a Medical Doctor in a professional manner in which data was collected on the group of individuals that proved beneficial to the added use of mirror therapy in conjunction with conventional physical therapy for patients with a recent stroke history.